Deliverables Listing
Metals Analyses

I. Chain of Custody

II. Narrative - Describe analyses performed and discuss any problems associated with the data reported.

III. Sample Results (for each sample)
- sample number
- date received
- matrix
- % solids (for non-aqueous samples only)
- concentration units
- metal and determined concentration

IV. QC Data (for those QC samples required by the method used to determine the metals analyzed for)

° Initial and Continuing Calibration Results
- source of calibration standard(s)
- concentration units
- true value (for each analyte)
- measured value (for each analyte)
- percent recovery (for each analyte)

° CRDL Standard Recoveries for AA and ICP. (These analyses are required under the CLP protocols, other methods may or may not require that a standard at or near the detection limit of the instrument be analyzed to verify acceptable performance at that concentration level. If the method does not require such an analysis than this form is omitted.)

same as listed for initial and continuing calibration

° Blanks
- preparation blank matrix
- instrument and preparation blank units
- initial calibration blank results
- continuing calibration blank results
- preparation blank results

° ICP Interference Check Sample (only needed if any analytes are determined by ICP methods)
- ICP instrument ID (only if more than one ICP) concentration units
- true values (for each analyte and solution)
- found values (for each analyte and solution)
- percent recovery (for each analyte)

- Matrix Spike Sample Recovery
  - matrix
  - concentration units
  - control limit
  - spike sample result
  - unspiked sample result
  - amount of spike added
  - percent recovery

- Post Digest Spike Sample Recovery. (These analyses are required under the CLP protocols, other methods may or may not require that a post digest spike sample analysis be performed when the pre-digestion spike recovery is outside acceptable limits. If the method does not require such an analysis than this form is omitted)

  - same as for matrix spike recovery

- Duplicates (note: for laboratory duplicate analysis results only)
  - matrix
  - percent solids for sample and duplicate (if non-aqueous matrix)
  - concentration units
  - control limit
  - sample results
  - duplicate results
  - relative percent difference (% RPD)

- Laboratory Control Sample
  - matrix
  - concentration units
  - true value
  - found value
  - percent recovery
  - control limits (if applicable)

- Method of Standard Addition Results (for each analyte result determined by MSA)

  - sample no.
  - analyte
  - 0 ADD ABS
  - 1 ADD and ABS
  - 2 ADD and ABS
  - 3 ADD and ABS
  - final conc.
  - correlation coefficient

- ICP Serial Dilutions (only if ICP methods were used)

  matrix
  concentration units
  initial sample result
  serial dilution result (corrected for dilution)
  percent difference

- Instrument Detection Limits

  instrument ID's
  wavelength
  type of background correction
  instrument detection limit

- ICP Interelement Correction Factors (only if ICP methods were used)

  wavelength
  correction factor by analyte/interfering analyte

- ICP Linear Ranges (only if ICP methods were used)

V. Raw Data

For each reported value, the laboratory should include in the data package all raw data from the instrument used to obtain the sample values and the QA/QC values reported (except for raw data for quarterly verifications of instrument parameters such as IDLs and interelement correction factors). Raw data must contain all instrument readouts used for the sample results, including those readouts that may fall below the IDL. All AA and ICP instruments should provide a legible hard copy of the direct real-time instrument readout (i.e., stripcharts, printer tapes, etc.). A photocopy of the direct sequential instrument readout must be included. A hardcopy of the direct instrument readout for cyanide should be included if the instrumentation has the capability.

All raw data should include intensities (ICP) and absorbances (AA) with concentration units (unless instrument direct readout is in concentration units). All flame and furnace AA data should be grouped by element.

To facilitate data validation, it is recommended that the raw data be identified to identify the following:

- Calibration standards, including source and prep date.

- Initial and continuing calibration blanks and preparation blanks.

- Initial and continuing calibration verification standards, interference check samples, and ICP serial dilution samples.

- Diluted and undiluted samples (by sample number) and all weights, dilutions and volumes used to obtain the reported values. (If the volumes, weights and dilutions are consistent for all samples in a given data package, a general statement outlining these parameters is sufficient).

- Duplicates.

- Spikes (indicating standard solutions used, final spike concentrations, volumes involved). If spike information (source, concentration, volume) is consistent for a given data package, a general statement outlining these parameters is sufficient).

- Instrument used, any instrument adjustments, data corrections or other apparent anomalies on the measurement record, including all data voided or data not used to obtain reported values and a brief written explanation.
- All information including date for furnace analysis clearly and sequentially identified on the raw data, including sample number, sample and analytical spike data, percent recovery, coefficient of variation, full MSA data, MSA correlation coefficient, slope and y intercept of linear fit, final sample concentration (standard addition concentration), and type of background correction used.

- Time and date of each analysis. Instrument run logs can be submitted if they contain this information. If the instrument does not automatically provide times of analysis, these should be manually entered on all raw data for initial and continuing calibration verification and blanks, as well as interference check samples and linear range analysis.

- Integration times for AA analyses.

VII. Digestion and Distillation Logs

Digestion and distillation logs for all samples analyzed should be submitted. These logs should include: (1) date, (2) sample weights and volumes, (3) sufficient information to unequivocally identify which QC samples (i.e., laboratory control sample, preparation blank) correspond to each batch digested, (4) comments describing any significant sample changes or reactions which occur during preparation, and (5) indication of pH <2 or >12, as applicable.